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URBAN AIR QUALITY

In Alberta, we are fortunate to be able to breathe clean, fresh air almost all of the time, even in our cities. However, automobile exhaust, fuel combustion for heating homes and businesses, and industrial emissions can occasionally compromise the quality of the air at urban locations. Because the majority of Alberta's population live in Edmonton and Calgary, these are the areas where air quality is of the greatest concern.

ALBERTA'S
STATE
OF THE
ENVIRONMENT

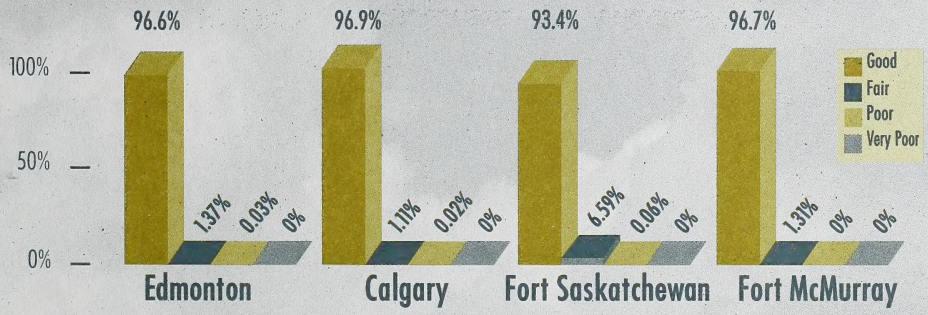
How is the air quality in Alberta cities?

In Alberta cities, air quality is *good* over 90% of the time, according to the Index of the Quality of the Air (IQUA). The index will occasionally reach into the *fair* range (less than 10% of the time). *Poor* and *very poor* air quality conditions are very rare in Alberta cities. For example, poor air quality conditions occurred for only seven hours at Edmonton stations in 1995. *Very poor* air quality was not recorded at any monitoring stations in 1995.

FACT SHEET

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Index of the Quality of the Air (1995)



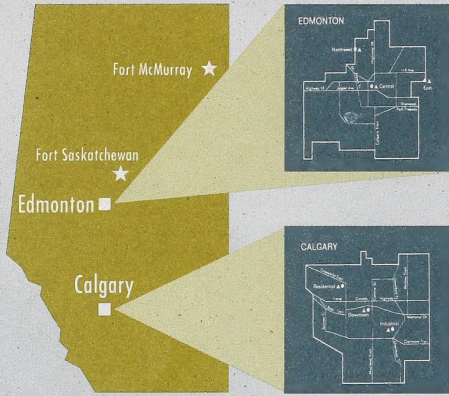
Edmonton and Calgary data is the average of the three stations in each city.

Atmospheric chemical concentrations measured in Edmonton, Calgary, Fort Saskatchewan and Fort McMurray are converted to one, simple indicator called the Index of the Quality of the Air, or IQUA. From the IQUA, we know whether the air quality is *good*, *fair*, *poor* or *very poor*. The IQUA converts the measurements from five major air pollutants (carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide) to a single number and matching description. For example, a rating of 0-25 indicates *good* air quality, 26-50 is *fair*, 51-100 is *poor*, and more than 100 is *very poor*. *Good*, *fair*, *poor*, and *very poor* air quality categories are related directly to provincial air quality guidelines and federal air quality objectives. The IQUA is available 24-hours a day by calling 427-7273 in Edmonton and 250-2099 in Calgary.



Alberta
ENVIRONMENTAL PROTECTION

Urban Air Quality Monitoring Stations



★ urban monitoring station

Urban air quality is monitored on a continuous basis in Edmonton (3 stations), Calgary (3 stations), Fort Saskatchewan and Fort McMurray. Short-term air quality studies have also been conducted in Medicine Hat, Lethbridge, Red Deer and Grande Prairie.

Chemicals monitored at urban stations include carbon monoxide, dust and smoke, hydrogen sulphide, oxides of nitrogen, ozone, sulphur dioxide, total hydrocarbons, suspended particulates, benzo (a) pyrene and volatile organic compounds.

When is air quality compromised?

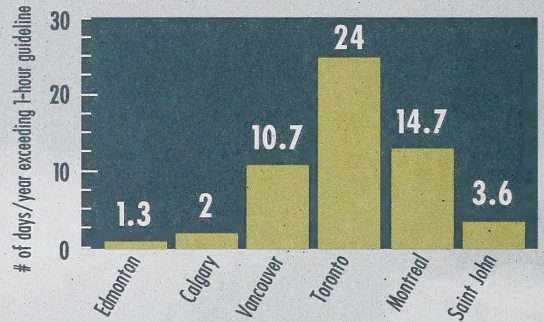
Poor air quality conditions occur primarily in the fall and winter seasons. During these seasons, the combination of deep temperature inversions and light winds will often create a layer of cold, stagnant air near the ground. Also, vehicles tend to idle longer and consumption for heating buildings increases during cold spells. Combustion products emitted mostly by automobiles are trapped in this layer of cold, stagnant air. In Edmonton these conditions usually occur with the approach of a warm

front. In Calgary, strong temperature inversions are common before the arrival of a chinook.

Fair and poor air quality can also occur in the heat of the summer. Under hot, calm weather conditions, photochemical smog can be formed through a complicated set of chemical reactions involving oxides of nitrogen and volatile hydrocarbons in the presence of sunlight. Photochemical smog has a noticeable light brown colour, and can reduce visibility and trigger respiratory response. Ground-level ozone is a component of major concern in photochemical smog.

In Alberta, photochemical smog is typically a concern only one or two days a year. Photochemical smog is considered an air pollution problem in Canada in the Lower Fraser Valley, the Windsor-Quebec corridor and the southern Atlantic provinces.

Number of Days per Year with High Ozone (1983-1989)



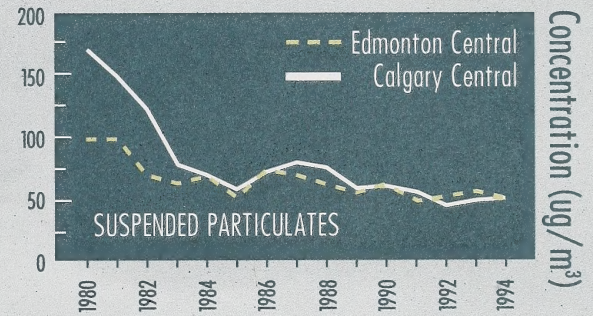
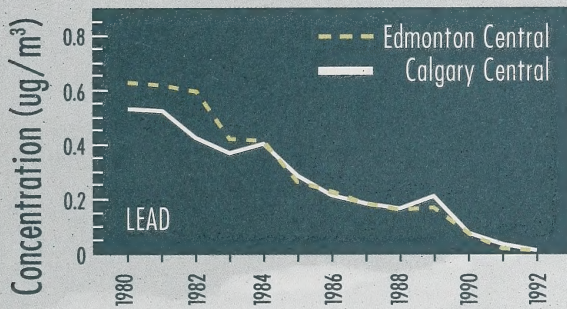
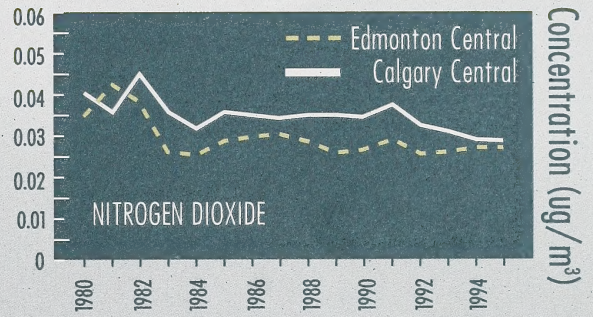
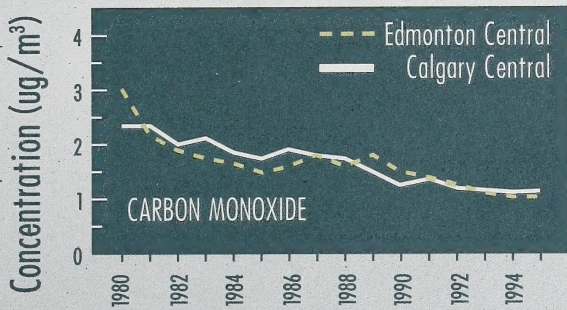
What are the sources of urban air pollution?

The major sources of atmospheric chemicals in Alberta cities are:

- (1) automobile emissions and traffic movement; and
 - (2) fuel combustion for heating of homes and businesses.
- Industries in and near urban locations can also influence local air quality (e.g. east Edmonton, Fort Saskatchewan and Fort McMurray).

Some chemicals emitted from vehicle exhaust include carbon monoxide, oxides of nitrogen, particulates and various types of hydrocarbons. Also, traffic movement, tire wear and brake wear can produce small particles which can influence air quality especially during calm, stable weather conditions.

What are the trends in urban air quality?



Concentrations of several pollutants that are contained in automobile emissions have shown a significant decrease in Alberta cities over the past two decades. Based on data in downtown Edmonton and Calgary from 1980 to 1994:

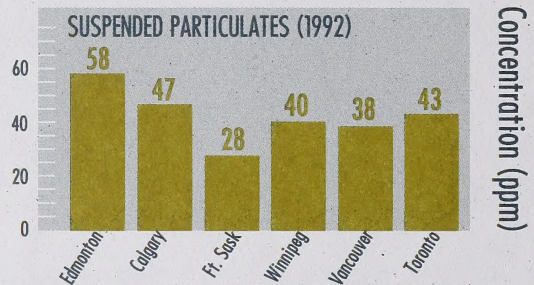
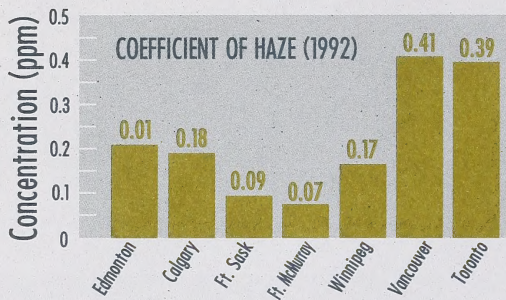
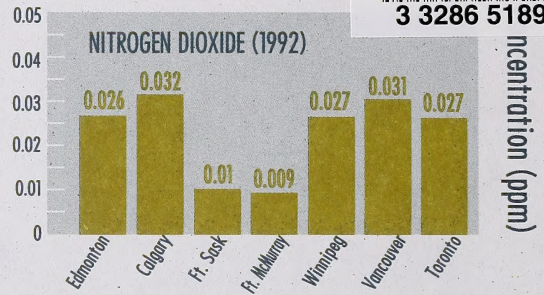
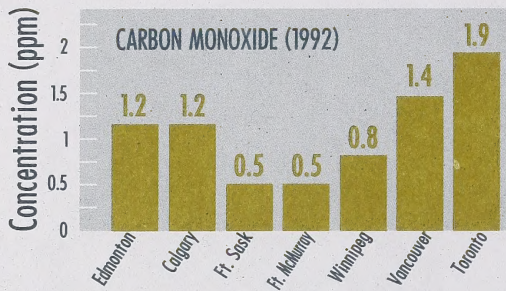
- carbon monoxide concentrations have **decreased** by 68% in downtown Edmonton and 54% in downtown Calgary;
- nitrogen dioxide concentrations have **decreased** by 25% in downtown Edmonton and 29% in downtown Calgary;

- suspended particulate values have **decreased** by 45% in downtown Edmonton and 66% in downtown Calgary; and
- lead concentrations have **decreased** by 96% in downtown Edmonton and 98% in downtown Calgary.

These decreases in chemical concentrations can be attributed to:

- (1) more efficient automobile engines;
- (2) less dust from roads; and
- (3) the removal of lead from gasoline.

How does air quality in Alberta cities compare with other Canadian cities?



Concentrations of urban pollutants in Alberta cities are typically close to values observed at other Canadian cities of similar size and population. Larger population centres such as Vancouver and Toronto experience higher concentrations of carbon monoxide and the coefficient of haze (dust and smoke) than Alberta cities. However, nitrogen dioxide concentrations in downtown Calgary are consistently as high as large Canadian cities. Also, suspended particulate values are generally higher in Alberta than other large urban locations. Higher suspended particulate values are primarily caused by residual dust from winter sanding with a significant contribution from agricultural dust. Smaller urban locations such as Fort Saskatchewan and Fort McMurray have much lower concentrations of all urban atmospheric chemicals compared to larger centres.

What is being done to maintain and improve air quality?

Monitoring air quality in larger urban centres allows Alberta Environmental Protection and the citizens of Alberta to gain a good understanding of urban air quality conditions. This knowledge of air quality permits decisions which will keep our air clean. To improve the management of air quality, the provincial government worked with a cross-section of stakeholders to create the Clean Air Strategic Alliance (CASA) in March of 1994.

CASA is a non-profit partnership consisting of members from three levels of government, industry and non-government environmental and health organizations. The goal of CASA is to develop a new air quality management system for Alberta. The steps to achieving this goal are to:

- clearly identify the most important air quality issues;
- prioritize specific problems;
- allocate and coordinate resources;
- develop solution-oriented action plans; and
- evaluate results.

Some of the issues being directly addressed by CASA are urban air quality, climate change, air toxics, sulphur dioxide management and regional air quality.

Details on air quality information presented in this fact sheet can be found in air quality quarterly and annual reports available from:

The Information Centre, Alberta Environmental Protection, Main floor, Bramalea Building • 9920 - 108 Street • Edmonton, Alberta • T5K 2M4
Phone: (403) 422-2079 Fax: (403) 427-4407

Current air quality readings are updated hourly and available 24-hours a day by calling the IQUA phone line at 427-7273 in Edmonton and 250-2099 in Calgary.